Annual Report to
NOAA's CPPA Program

"**Evaluation and Improvement of NOAA Climate GCM Air-Sea Interaction Physics: An EPIC/VOCALS Synthesis Project**"
**GC07-095**

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**PROJECT REPORT FIGURES**

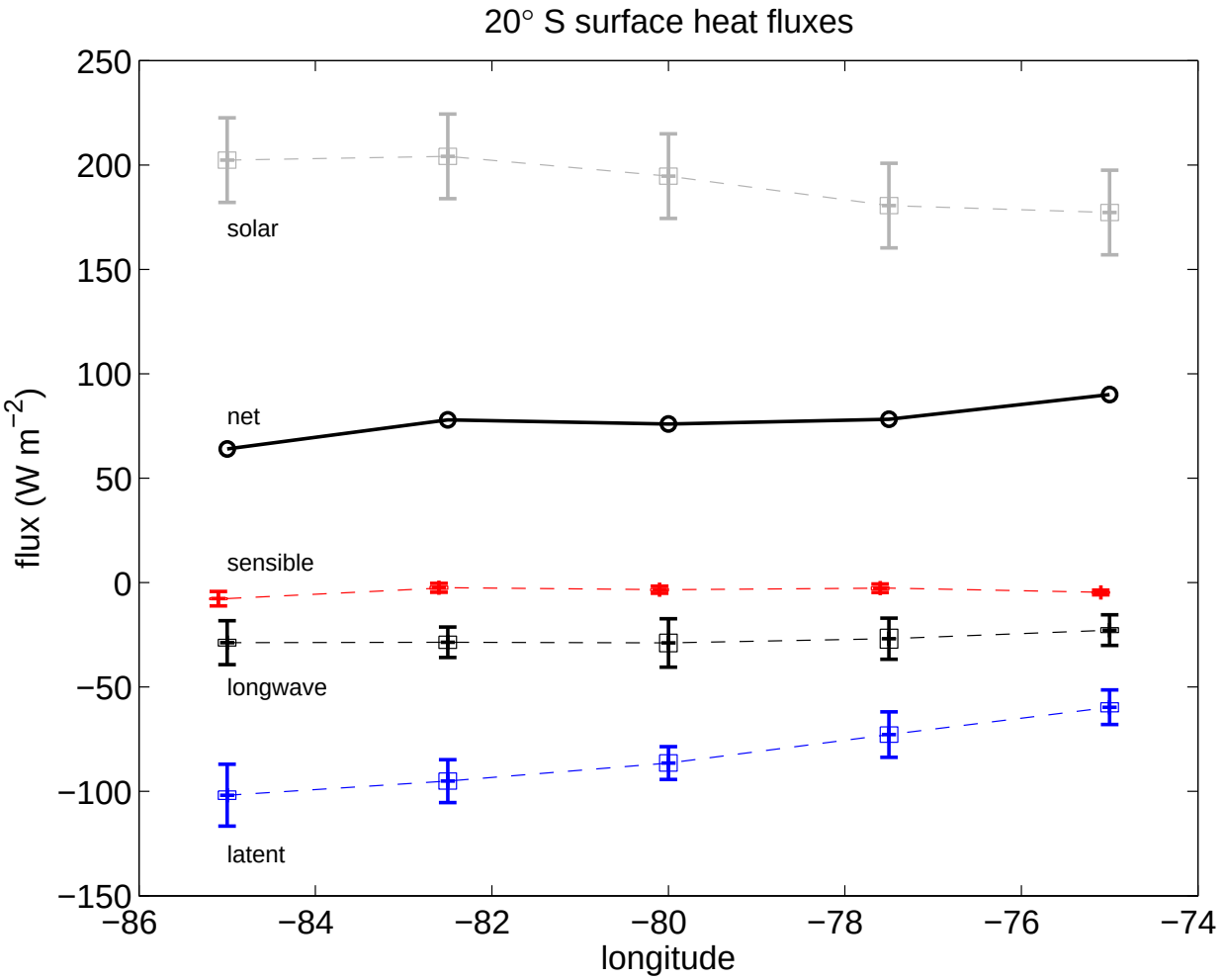


**Figure 1.** October surface heat flux averages from 4 ship transects along 20º S, 75º-85º W in 2.5º longitude bins. Positive terms warm the ocean surface. Whiskers indicated the standard error.

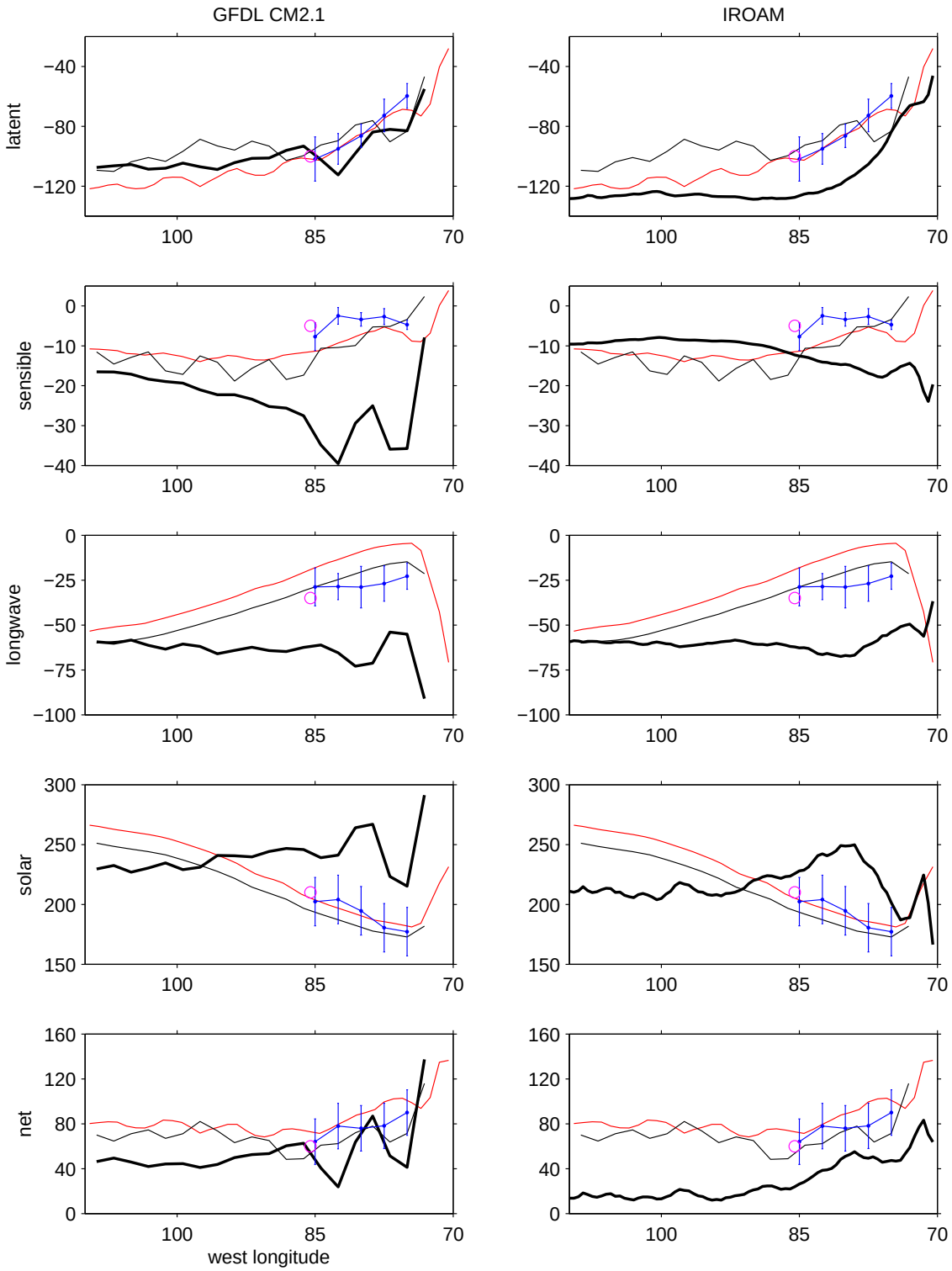


**Figure 2.** Models compared to ship observations (blue dot-and-whiskers) and the WHOI (red circle) and CORE (thin black) surface heat flux analyses. GFDL CM2.1 (left) and IROAM (right) are shown by the thick black lines.

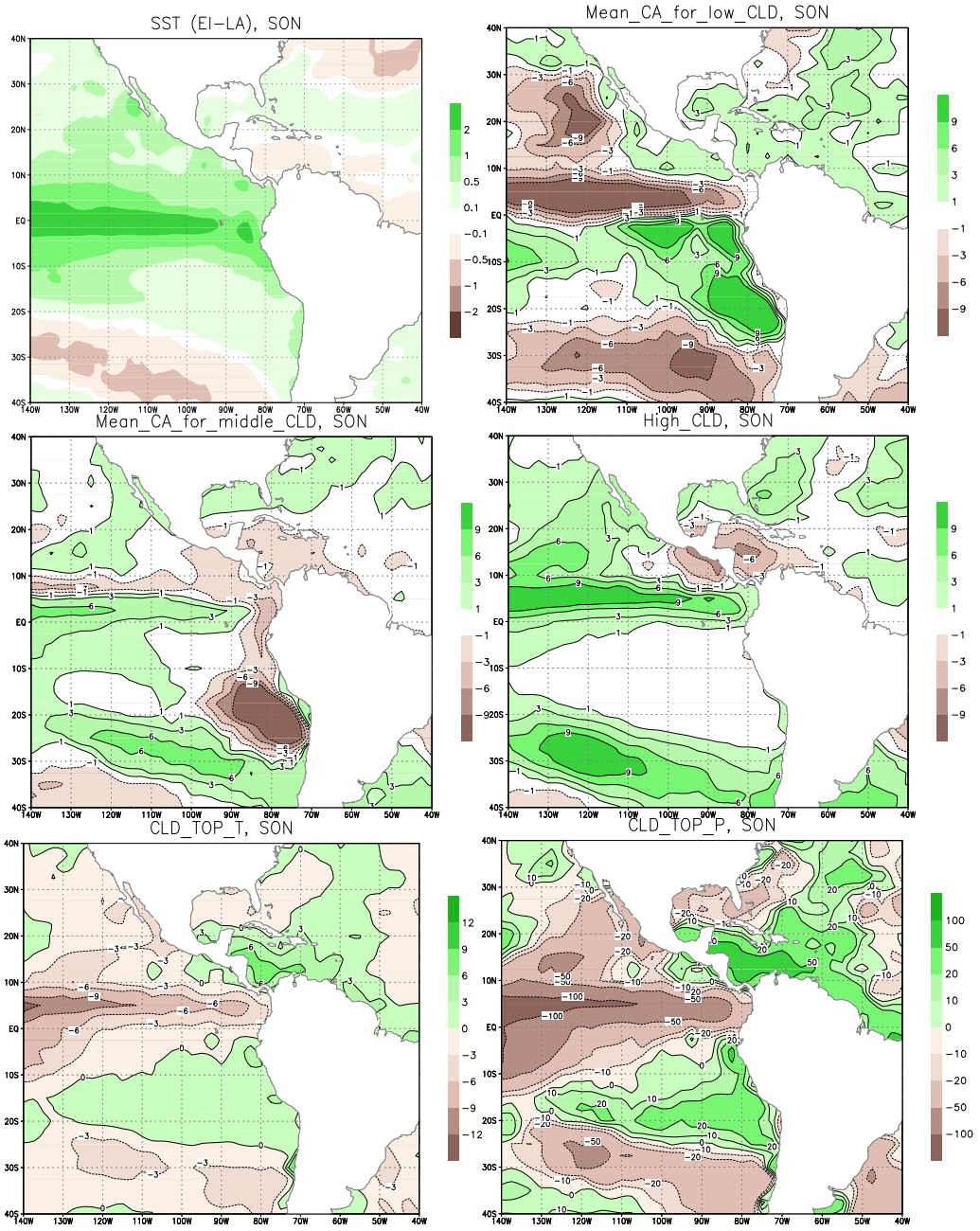


**Figure 3**. El-La in (a) SST (b) low cloud (c) middle cloud (d) High cloud (e) mean cloud top temperature for total clouds (f) mean cloud top pressure for total clouds

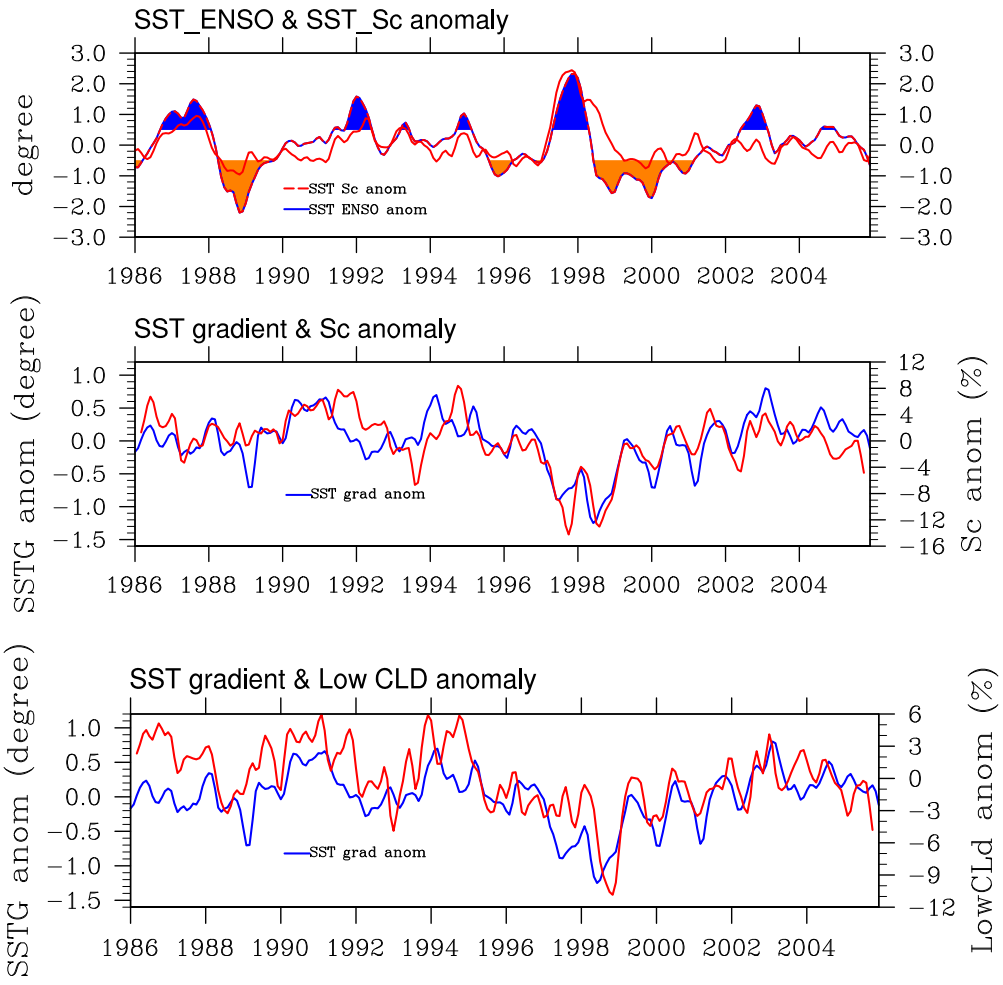


**Figure 4**. (a) Time series of SST anomalies over Nino3.4 region (110-70W, 5S-5N) and the SEP (110-80W, 20-5S) with 3-monthly running mean; (b) Time series of stratocumulus anomalies over SEP region (110-80W, 20-5S) and SST gradient between ITCZ region (140-90W, 0-15N) and SEP with 3-monthly running mean; (c) same as (b) but for SST gradient and low cloud anomaly.

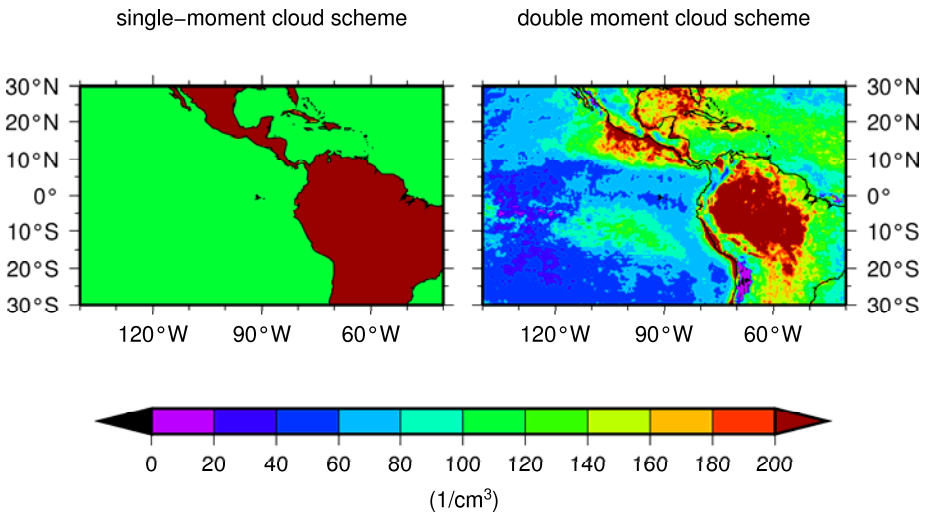


**Figure 5.** Monthly mean cloud droplet number concentration of low water clouds, left: single-moment scheme, right: double-moment scheme. The single-moment scheme assumes a fixed droplet number (100 $cm^{-3}$ above the oceans and 300 $cm^{-3}$ above the continents), whereas the double-moment scheme calculates droplet number from simulated aerosols and meteorology. In agreement with observations, the double-moment cloud schemes shows low droplet concentrations above the remote oceans and higher droplet concentrations near the coast lines resulting from continental outflow of cloud condensation nuclei.

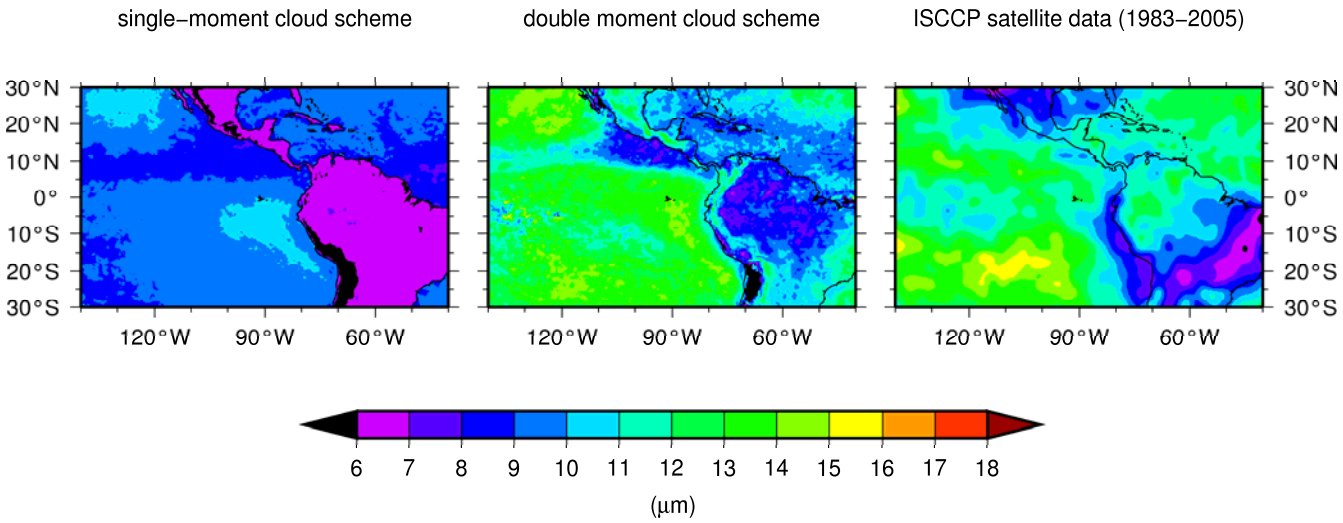


**Figure 6.** Monthly mean cloud droplet effective radii in comparison with climatological monthly means from ISCCP satellite observations (1983-2005), left: single-moment scheme, middle: double-moment scheme, right: ISCCP satellite data. The double moment scheme is able to capture the basic features of the geographic distribution, improving the agreement between model data and satellite observations compared to the single-moment cloud scheme.